

# PATENT COOPERATION TREATY



## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D U 3 FEB 2006

Applicant's or agent's file reference <b>BPX 10106</b>	<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	WIPO PGT
International application No. <b>PCT/GB2004/005137</b>	International filing date (day/month/year) <b>08.12.2004</b>	Priority date (day/month/year) <b>23.12.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>E21B43/10, E21B17/04</b>		
Applicant <b>BP EXPLORATION OPERATING COMPANY LIMITED et al</b>		
<ol style="list-style-type: none"> <li>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</li> <li>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</li> <li>3. This report is also accompanied by ANNEXES, comprising:               <ol style="list-style-type: none"> <li>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:                   <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> </li> <li>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</li> </ol> </li> </ol>		
<ol style="list-style-type: none"> <li>4. This report contains indications relating to the following items:               <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul> </li> </ol>		
Date of submission of the demand  <b>15.07.2005</b>	Date of completion of this report  <b>06.02.2006</b>	
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  <b>Schouten, A</b>  Telephone No. +31 70 340-4088  	

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/005137

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-16 as originally filed

**Claims, Numbers**

1-10 received on 22.09.2005 with letter of 13.09.2003

**Drawings, Sheets**

1/16-16/16 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-10
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1) The documents US-A1-2003/0222409 and US-B1-6.171.351 were not cited in the international search report. Copies of the documents are appended hereto.

2) Reference is made to the following documents:

D1: GB-A-2.345.308

D2: US-A1-2003/0222409

D3: US-B1-6.171.351

3) The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1 and 8 does not involve an inventive step in the sense of Article 33(3) PCT.

4) The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses on page 5, lines 17-24; page 9, lines 13-21; page 11, lines 8-20; page 15, lines 11-21 and in figures 1 and 2 (the references in parentheses applying to this document):

A method for connecting a first tubular element (14) and a second tubular element (12) comprising:

- locating a portion of the first tubular element (14) within a portion of the second tubular element (12),
- expanding (figure 2) the portion of the first tubular element (14) and/or compressing the portion of the second tubular element (12) to form a connection resulting from the interference between the external surface of the portion of the first tubular element (14) and the internal surface of the portion of the second tubular element (12),

- in which, prior to assembly, one or both of the external surface of the portion of the first tubular element (14) and the internal surface of the portion of the second tubular element (12) is/are at least partially coated with hard angular material (20), wherein the hard angular material (20) is applied to the external surface of the portion of the first tubular (14) element and/or the internal surface of the portion of the second tubular element (12) to form protuberances on the surface.

The subject-matter of claim 1 therefore differs from this known method for connecting a first tubular element and a second tubular element in that the material is applied to the surface by plasma spraying.

The problem to be solved by the present invention may therefore be regarded as: providing an alternative way of depositing a material on the surface of a tubular element.

The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons: the mentioned feature (plasma spraying) has already been employed for the same purpose in a similar method for connecting a first tubular element and a second tubular element, see document D2, paragraphs [0047] and [0048]. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply this feature with corresponding effect to a method for connecting a first tubular element and a second tubular element according to document D1, thereby arriving at a method for connecting a first tubular element and a second tubular element according to claim 1.

Furthermore it is noted that the relatively hard material in the form of relatively small individual elements, such as sharps, grit or balls of carbide or some other relatively hard material as described in D1 (see page 11, lines 8-20) themselves form protuberances when placed on the surface of the tubular element.

5) The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claim 8 which therefore is also considered not inventive.

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(SEPARATE SHEET)**

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6) Dependent claims 2-7, 9 and 10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step for the following reasons:

Claims 2 and 3: see D3, column 4, lines 39-58, furthermore it is noted that using a foraminous mask is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

Claim 4: see D1, page 15, lines 11-21 and page 11, lines 17-18.

Claim 5, 6, 7: see D1, page 5, lines 17-24; page 9, lines 13-21; page 11, lines 8-20; page 15, lines 11-21 and figures 1 and 2.

Claim 9, 10: These features are merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

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Claims:

1. A method for connecting a first tubular element and a second tubular element comprising:

locating a portion of the first tubular element within a portion of the second tubular element,

5 expanding the portion of the first tubular element and/or compressing the portion of the second tubular element to form a connection resulting from the interference between the external surface of the portion of the first tubular element and the internal surface of the portion of the second tubular element,

10 in which, prior to assembly, one or both of the external surface of the portion of the first tubular element and the internal surface of the portion of the second tubular element is/are at least partially coated with hard angular material, characterised in that the hard angular material is applied to the external surface of the portion of the first tubular element and/or the internal surface of the portion of the second tubular element by plasma spraying to form protuberances on the surface.

15 2. A method as claimed in claim 1 in which a mask is used to form the protuberances.

3. A method as claimed in claim 2 in which a foraminous mask is placed over at least part of the external surface of the portion of the first tubular element and/or part of the internal surface of the portion of the second tubular element before the surface is  
20 sprayed such that the plasma spray passes through holes in the mask, forming protuberances on the surface of the surface when the mask is removed.

4 A method as claimed in any one of claims 1 to 3 in which part of the portion of

the first tubular element and a corresponding part of the portion of the second tubular element are not coated by plasma spraying such that when the connection is expanded these bare metal parts form a metal-to-metal seal.

5. A method as claimed in any one of claims 1 to 4 in which two pipes are connected by locating one end of each of the pipes over a pin of a male/male connector and within the box of a female/female connector and expanding the internal diameter of the male/male connector.

6. A method as claimed in any one of claims 1 to 5 in which at least one element designed to be embedded in the surfaces as the connection is expanded is located between the external surface of the portion of the first tubular element and/or part of the internal surface of the portion of the second tubular element

7. A method for connecting piping used in oil and gas boreholes comprises connecting pipes together as claimed in any one of claims 1 to 6, lowering the pipe string into the borehole and subsequently radially expanding the pipe string downhole.

8. An expandable tubular element suitable for forming connections by a method as claimed in any one of claims 1 to 7 having protuberances on a part of its surface adjacent at least one end thereof which have been formed by plasma spraying a hard angular material.

9. An expandable tubular element as claimed in claim 8 which is a male/male coupling comprising two pin connectors the plasma sprayed protuberances being on the external surfaces of the pin connectors.

10. An expandable tubular element as claimed in claim 8 which is a female/female coupling comprising two box connectors the plasma sprayed protuberances being on the internal surfaces of the box connectors.